



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE

United States Patent and Trademark Office

Address: COMMISSIONER FOR PATENTS

P.O. Box 1450

Alexandria, Virginia 22313-1450

www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/587,541	07/28/2006	Yoshiyuki Nasuno	900-559	8895
23117 7590 10/14/2010 NIXON & VANDERHYE, PC 901 NORTH GLEBE ROAD, 11TH FLOOR ARLINGTON, VA 22203				
EXAMINER				
GARDNER, SHANNON M				
ART UNIT		PAPER NUMBER		
1723				
MAIL DATE		DELIVERY MODE		
10/14/2010		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/587,541

Applicant(s)

NASUNO ET AL.

Examiner

Shannon Gardner

Art Unit

1723

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2010 (Supplemental Amendment).
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11-15, 25-43 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11-15 and 25-43 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Amendment

Applicant's amendment of 7/29/2010 does not render the application allowable.

Remarks

Applicant has amended claims 11-14 and 25. Claims 11-15 and 25-43 are pending in the application and are considered on the merits below.

Status of Objections and Rejections

The rejection of claims 14 and 15 under 35 U.S.C. 112, second paragraph as being indefinite is withdrawn in view of Applicant's amendment.

All other grounds of rejection are withdrawn in view of Applicant's amendments. New grounds of rejection necessitated by the amendments are set forth below.

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 11-12, 25-27 and 30 are rejected under 35 U.S.C. 102(b) as being anticipated by Kuwano (US 4281208).

As to claim 11, Kuwano is directed to a photoelectric conversion device (Figure 4) comprising:

- A photoelectric conversion layer (10) and a backside electrode layer (111-113) stacked in this order on a structure (see Figure 4), wherein

- The structure comprises:
 - A substrate (7); and
 - A transparent electrode layer (91-93) formed on at least part of a surface region of the substrate (7), the transparent electrode layer having at least an opening portion within which the transparent electrode layer is absent (openings between 91, 92 and 93).

As to claim 12, Kuwano is directed to a stacked photoelectric conversion device (Figure 4), comprising:

- A plurality of photoelectric conversion layers (81, 82, 83) and a backside electrode (111, 112, 113) layer stacked in this order on a structure; and
- A first intermediate layer (161) sandwiched between at least a pair of adjacent two photoelectric conversion layers (see Figure 6), wherein
- The structure comprises:
 - A substrate (7); and
 - A first transparent electrode layer (91, 92, 93) formed on at least part of a surface region of the substrate (7), the first transparent electrode layer having at least an open portion within which the first transparent electrode layer is absent (openings between 91, 92 and 93).

Regarding claim 25, the reference teaches the substrate (7) being a transparent substrate such that the transparent electrode (91-93) layer is formed on the surface region of the transparent substrate (column 5, lines 41-44 teaches a glass substrate).

Regarding claim 26, the reference teaches the transparent electrode layer having a texture surface on its surface (see Figure 4; electrode layer is defined by 91, 92, 93 and the openings in between and therefore the surface reads on the instant texture surface).

Regarding claim 27, the reference teaches the transparent electrode layer being ITO (column 5, lines 6-11) and the substrate being glass (column 5, lines 41-44). Applicant states in the instant specification that both materials are appropriate choices for the electrode layer and substrate, respectively (paragraphs [0156]-[0157]). It is the Examiner's position that the haze index at 550 nm wavelength of the transparent electrode layer and a light transmittance of a combination of the transparent substrate and the transparent electrode layer are inherent characteristics of these materials. Further, where the claimed and prior art products are substantially identical in structure, a *prima facie* case of anticipation has been established (*In re Best* and MPEP § 2112.01).

Regarding claim 30, the reference teaches that the opening portions (spaces between 91, 92 and 93) do not include grooves for separating a transparent electrode provided for forming an integrated structure in which a plurality of photoelectric conversion cells are electrically connected in series (see Figure 4). The Examiner notes that Figures 4-6 of Kuwano do not show a groove *in* the opening portion.

3. Claims 11, 25-27, 29-31 and 35 are rejected under 35 U.S.C. 102(b) as being anticipated by Sato (EP 1443527, cited in IDS).

As to claim 11, Sato is directed to a photoelectric conversion device (Figures 1 and 5), comprising:

- A photoelectric conversion layer (42) and a backside electrode layer (43) stacked in this order on a structure (see Figure 5), wherein
- The structure comprises:
 - A substrate (44 and 1); and
 - A transparent electrode layer (45 and 4/5 of Figure 1) formed on at least part of a surface region of the substrate (1), the transparent electrode layer having at least an opening portion within which the transparent electrode layer is absent (see Figure 1).

Regarding claim 25, the reference teaches the substrate being a transparent substrate (glass; paragraph [0026]) such that the transparent electrode layer is formed on the surface region of the transparent substrate (see Figure 1 and paragraph [0033]).

Regarding claim 26, the reference teaches the transparent electrode layer having a texture structure on its surface (Figure 1; paragraph [0035], continuous layer 5 has projections/texture).

Regarding claim 27, the reference teaches a haze from 10 to 95% over a full wavelength region of 400-800nm (paragraph [0025]) and further teaches the transparent electrode layer being ITO and the transparent substrate being glass (paragraphs [0026]-[0051]). Applicant states in the instant specification that both materials are appropriate choices for the electrode layer and substrate, respectively (paragraphs [0156]-[0157]). It is the Examiner's position that the haze index at 550 nm

wavelength of the transparent electrode layer and a light transmittance of a combination of the transparent substrate and the transparent electrode layer are inherent characteristics of these materials. Further, where the claimed and prior art products are substantially identical in structure, a *prima facie* case of anticipation has been established (*In re Best* and MPEP § 2112.01).

Regarding claim 29, the reference teaches the opening portion not electrically separating the transparent electrode layer (Figure 1).

Regarding claim 30, the reference teaches that the opening portions do not include grooves for separating a transparent electrode provided for forming an integrated structure in which a plurality of photoelectric conversion cells are electrically connected in series (see Figures 1 and 5).

Regarding claim 31, the reference teaches the transparent electrode layer (4) being a first transparent electrode layer, the device further comprising a second transparent electrode layer (5) formed on the first transparent electrode layer (4) so as to be formed in between the first transparent electrode layer and the photoelectric conversion layer, wherein the second transparent electrode layer covers some or all of the opening portions (see Figure 1).

Regarding claim 35, the reference teaches the substrate (1) having a metal film, transparent conductive film or an insulating film on the surface thereof (paragraph [0028]).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

6. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

7. Claims 28, 32-33 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sato (EP 1443527, cited in IDS) as applied to claims 25 and 31 above.

Regarding claim 28, Applicant is directed above for a full discussion of Sato as applied to claim 25. Sato teaches an aperture ratio of the transparent electrode layer ranging from 0.1 to 0.7 (10%-70%; paragraph [0038]), the aperture ratio being defined as a sum of the areas of the opening portions of a surface area divided by the surface area, the surface area being an area of the surface region of the transparent substrate on which the transparent electrode layer is formed (paragraph [0038]), and wherein an average radius of the opening portions over the surface area is 0-2 μm , in which a radius r_n of an n'th opening portion is calculated by a formula $r_n = (S_n/\pi)^{1/2}$, n being an integer from 1 to k in which k is a number of the opening portions and S_n being an area of the n'th opening portion (see paragraphs [0019] and [0033]-[0057] and Figure 1).

In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists (*In re Wertheim* and MPEP § 2144.05).

Regarding claim 32, Applicant is directed above for a full discussion of Sato as applied to claim 31. Sato teaches a thickness of the first layer (H_c) preferably being from 0.2-1.0 μm (200-1000 nm; paragraph [0052]) and a thickness of the second transparent electrode layer (H_e) being 0.5 to 1.0 μm (500-1000 nm; paragraph [0055]). Therefore, the reference teaches points where the thickness of the second transparent electrode layer is less than a thickness of the first transparent layer. In the case where

the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists (*In re Wertheim* and MPEP § 2144.05).

Regarding claim 33, the reference teaches the thickness of the first transparent electrode layer ranging from 200-1000 nm (paragraph [0052]). In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists (*In re Wertheim* and MPEP § 2144.05).

Sato teaches the second transparent electrode being 200-2000 nm (paragraph [0019]) but does not teach the second transparent electrode ranging substantially between 10 nm and 100 nm.

However, in *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device (see MPEP § 2144.14 IV).

Regarding claim 34, the reference teaches a synthesized sheet resistance of the first and second transparent electrode substantially ranging between $8 \Omega/\square$ and $20 \Omega/\square$ (paragraph [0067]). In the case where the claimed ranges "overlap or lie inside ranges disclosed by the prior art" a *prima facie* case of obviousness exists (*In re Wertheim* and MPEP § 2144.05).

8. Claims 11-15, 25 and 36-43 are rejected under 35 U.S.C. 103(a) as being unpatentable over Suzuki (US 5350459) in view of Sato (EP 1443527, cited in IDS).

As to claim 11, Suzuki is directed to a photoelectric conversion device (Figure 1), comprising:

- A photoelectric conversion layer (EAOLs and EDOLs) and a backside electrode layer (3) stacked in this order on a structure (1/2), wherein
- The structure comprises:
 - A substrate (1); and
 - A transparent electrode layer (2) formed on at least part of a surface region of the substrate (1).

Suzuki is silent as to the first transparent electrode layer having at least an opening portion within which the first transparent electrode layer is absent.

However, it is known in the photoelectric art to utilize a substrate (1) with a transparent electrode (4) having at least an opening portion within which the first electrode layer is open (see Figure 1) as the structure on which to form a photoelectric conversion device as such a substrate structure has excellent mass production efficiency, low resistance, high transparency and a good light scattering performance as taught by Sato (Figure 1 and abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the substrate structure having a transparent electrode with at least an opening portion within which the first electrode layer is open in the device of

Suzuki as such a structure has excellent mass production efficiency, low resistance, high transparency and a good light scattering performance as taught by Sato.

As to claim 12, Suzuki is directed to a stacked photoelectric conversion device (Figure 1), comprising:

- A plurality of photoelectric conversion layers (EAOLs and EDOLs) and a backside electrode layer (3) stacked in this order on a structure; and
- A first intermediate layer (EAOL II) sandwiched between at least a pair of adjacent two photoelectric conversion layers (EAOL I and EDOL II), wherein
- The structure comprises:
 - A substrate (1);
 - A first transparent electrode layer (2) formed on at least a part of a surface region of the substrate (1).

Suzuki is silent as to the first transparent electrode layer having at least an opening portion within which the first transparent electrode layer is absent.

However, it is known in the photoelectric art to utilize a substrate (1) with a transparent electrode (4) having at least an opening portion within which the first electrode layer is open (see Figure 1) as the structure on which to form a photoelectric conversion device as such a substrate structure has excellent mass production efficiency, low resistance, high transparency and a good light scattering performance as taught by Sato (Figure 1 and abstract).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to utilize the substrate structure having a transparent electrode with at least an opening portion within which the first electrode layer is open in the device of Suzuki as such a structure has excellent mass production efficiency, low resistance, high transparency and a good light scattering performance as taught by Sato.

Regarding claim 13, modified Suzuki teaches the first intermediate layer having at least an opening portion within which the first intermediate layer is absent (pin holes; column 40, lines 20-25), and the pair of the photoelectric conversion layers sandwiching the first intermediate layer therebetween come into contact with each other through the opening portion of the first intermediate layer (column 6, lines 64-81 and column 40, lines 21-32).

Regarding claim 14, modified Suzuki teaches the first intermediate layer (EAOL II) having at least an opening portion within which the first intermediate layer is absent (pin holes), the device further comprising a second intermediate layer (EDOL I) between the first intermediate layer (EAOL II) and the photoelectric conversion layer thereon (EAOL I and EDOL II), the second intermediate layer covering the opening portion of the first intermediate layer (column 6, lines 64-68 and column 40, lines 21-32).

Regarding claim 15, modified Suzuki teaches the second intermediate layer (EDOL I) having a thinner film thickness than that of the first intermediate layer (EAOL II) (see column 40, line 56 to column 41, line 51).

Regarding claim 25, modified Suzuki teaches the substrate (1) being a transparent substrate (glass) such that the transparent electrode layer (4) is formed on

the surface region of the transparent substrate (see Sato; paragraphs [0026] and [0033] and Figure 1).

Regarding claim 36, modified Suzuki teaches the photoelectric conversion layer being a first photoelectric conversion layer, the device further comprising an intermediate layer formed on the first photoelectric conversion layer; and a second photoelectric conversion layer formed on the intermediate layer (see Figure 1).

Regarding claim 37, modified Suzuki teaches the opening portions of the transparent electrode layer being first opening portions and the intermediate layer having a plurality of second opening portions within which the intermediate layer is absent (pin holes; column 40, lines 20-25).

Regarding claim 38, modified Suzuki teaches pin holes in the intermediate layer therefore, the holes/openings in the second organic photoactive layer causes the first deposited layer to be in direct contact with the third deposited layer thus having the first and second photoelectric conversion layer being in contact through the second opening portions (column 6, lines 64-68 and column 40, lines 21-32).

Regarding claim 39, modified Suzuki teaches the intermediate layer being a first intermediate layer, the device further comprising a second intermediate layer (EDOL I) being formed on the first intermediate layer (EAOL II) so as to be formed in between the first intermediate layer and the second photoelectric conversion layer (see Figure 1) wherein the second intermediate layer covers some or all of the second opening portions (see column 40, lines 20-32 and column 6, lines 64-68).

Regarding claims 40-41, modified Suzuki teaches that in order to alter the occurrence of short-circuits in the device, the presence of pin holes can be reduced. A variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation (see *In re Antonie* and MPEP § 2144.05).

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the aperture ratio of the intermediate layer (by altering the presence of pin holes) in order to reduce the occurrence of short-circuits in the device such that the aperture ratio falls within an optimum or workable range (such as the instant 16% to 63%).

Regarding claim 42, modified Suzuki teaches an intermediate layer with pin holes (column 40, lines 20-32). This structure reads on a texture on the surface of the intermediate layer.

Regarding claim 43, modified Suzuki does not specifically teach a short circuit current density of the first and second photoelectric conversion layers being equal. However, the reference does teach the benefits of reducing occurrence of short-circuits (column 40, lines 11-33) of both the first and second photoelectric conversion layers.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to modify the short-circuit occurrence as taught by Suzuki such that the current density of the first and second layer are substantially equal.

Response to Arguments

9. Applicant's arguments with respect to claims 11-15 have been considered but are moot in view of the new ground(s) of rejection necessitated by the amendments.

Conclusion

10. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Contact/Correspondence Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shannon Gardner whose telephone number is (571)270-5270. The examiner can normally be reached on Monday to Thursday, 5am-3pm EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571.272.1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. G./
Examiner, Art Unit 1723

/Keith Walker/
Primary Examiner, Art Unit 1726